CLAIMS:

1. An analog-to-digital-converter comprising a sigma-delta modulator (SD) for analog to digital converting analog input signals, said sigma-delta modulator including a feedback loop with a forward path and a feedback path, wherein the forward path comprises a summing node (C_3) with a first input receiving the analog input signals, noise-shaping filtering means (G) coupled to the output of said summing node and a quantizer (Q) coupled to the output of the noise-shaping filtering means and wherein the feedback path is connected to supply output signals of the quantizer (Q) to a second input of the summing node (C_3), characterized in that both the forward path and the feedback path have filtering means that are arranged to additionally constitute a filtering signal transfer function.

2. An analog-to-digital-converter as claimed in claim 1 characterized in that the forward path of the feedback loop comprises, in addition to said noise shaping filtering means (G), a first filter (L) for constituting the filtering signal transfer function, that the feedback path of the feedback loop comprises a second filter (H) for constituting the filtering signal transfer function and that the product of the transfer function of the first filter and the transfer function of the second filter is substantially frequency-independent.

3. An analog-to-digital converter as claimed in claim 1 having an input for receiving an input signal X(s) and an output for providing an output signal Y(z), the sigma delta modulator comprising:

- a summing node (C_3), a first filter (L), a second filter (H), a third filter (G), a comparator (Q), and a digital-to-analog converter (D);
- means to couple the input of the analog-to-digital converter and an output of the second filter (H) to the summing node;
- means to cascade the first filter (L) with the third filter (G);
- means to couple the cascade of said first and third filters between an output of the summing node and an input of the comparator (Q);
- means to couple an output of the comparator (Q) to the output of the analog-to digital converter and to an input of the digital-to-analog converter (D);

- means to couple an output of the digital-to-analog converter (D) to an input of the second filter (H);

whereby the product of the transfer function of the first filter (L) and the transfer function of the second filter (H) is frequency independent.

4. An analog-to-digital converter as claimed in claim 2 or 3 characterized in that said product is substantially equal to 'one'.

5. An analog-to-digital converter as claimed in claim 1 characterized by a second summing node (C_4) with first and second inputs and an output, by a first filter (F_1) with transfer function $F_1(s)$ connected between the output of the first mentioned summing node (C_3) and the first input of the second summing node (C_4), a second filter (F_2) with transfer function $F_2(s)$ connected between the output of the quantizer (Q) and the second input of the second summing node (C_4) and a third filter (F_3) with transfer function $F_3(s)$ between the output of the second summing node (C_4) and the input of the quantizer (Q), wherein the transfer function $F_1(s)/(F_1(s)+F_2(s))$ provides the filtering signal transfer function of the analog-to-digital-converter.

6. An analog-to-digital converter as claimed in claim 5, characterized in that the transfer function $F_2(s)$ of the second filter (F_2) is complementary to the transfer function $F_1(s)$ of the first filter (F_1) whereby the sum of the transfer functions $F_1(s)$ and $F_2(s)$ is substantially frequency independent and the third filter (F_3) provides the noise shaping function.

7. An analog-to-digital converter as claimed in claim 1, having an input for receiving an input signal (X(s)) and an output for providing an output signal (Y(z)), the sigma delta modulator comprising:

- means for connecting an input signal (X(s)) to a first summing node (C_3);
- a first filter (F_1) having an input coupled to the first summing node (C_3) and an output coupled to a second summing node (C_4),
- a digital-to-analog converter (D) having an input coupled to the output of the analog-to-digital converter and an output coupled to an input of a second filter (F_2);
- an output of the second filter (F_2) being coupled to the second summing node (C_4);
- a third filter (F_3) having an input coupled to the second summing node (C_4)

and an output coupled to the output of the analog-to-digital converter via a quantizer (Q);

- the output of the digital-to-analog converter (D) further being coupled to the first summing node (C_3);

whereby the sum of the transfer functions of the first and second filters is substantially frequency independent.

8. An analog-to-digital converter as claimed in claim 6 or 7, characterized in that the sum of the transfer functions of the first and second filters is substantially equal to 'one'.

9. An analog-to-digital converter as claimed in any of the preceding claims characterized in that the sigma-delta modulator comprises one or more gain controlled stages (M_1, I_1, M_3, D).

10. An analog-to-digital converter as claimed in claim 2 or 5, characterized in that the second filter (H, F_2) is a digitally implemented filter having an input connected to the output of the quantizer and an output coupled to at least one summing node through a digital to analog converter.

11. An analog-to-digital converter as claimed in claim 1 having an input for receiving an input signal X(s) and an output for providing an output signal Y(z), the analog-to-digital converter comprising:

- a first summing node (C_3), a second summing node (C_4), a first digital-to-analog converter (D_1), a second digital-to-analog converter (D_2), a first filter (F_1), a second filter (F_2), a third filter (F_3), and a quantizer (Q);
- means for coupling an input of the first digital-to-analog converter (D_1) to an output of the quantizer(Q) and to couple an output of the first digital-to-analog converter (D_1) to the first summing node;
- means to couple an input of the first filter to the first summing node (C_3) and to couple an output of the first filter (F_1) to the second summing node (C_4);
- means to couple an input of the second filter (F_2) to the output of the converter and to couple an output of the second filter to the input of the second digital-to-analog converter (D_2);
- means to couple an output of the second digital to analog converter (D_2) to the second summing node (C_4);

- means to couple an input of the third filter (F_3) to the second summing node (C_4) and to couple an output of the third filter to an input of the quantizer (Q);
- means to couple the output of the analog-to-digital converter to the output of the quantizer (Q);
- wherein the sum of the transfer function of the first filter and the analog version of the transfer function of the second filter is constant within the loop bandwidth of the converter.

12. A receiver comprising an analog-to-digital converter as claimed in any of the claims 1 to 11.

13. A receiver as claimed in claim 12 in as far as dependent on claim 1, characterized in that it comprises means for receiving a plurality of communication channels, a mixer (M) for frequency-converting at least part of said communication channels, the analog-to-digital-converter for analog to digital converting output signals of the mixer wherein the signal transfer function of the sigma delta modulator has a pass band that substantially corresponds with the frequency band of the desired channel while the interferer channels beyond that pass band are substantially attenuated.

14. A receiver as claimed in claim 12 in as far as dependent on any of the claims 3 to 12, , characterized in that the input signal is an FM-modulated analog signal and that, for the purpose of FM-demodulation of the signal, one of the first and second filters is a differentiator and the other of the first and second filters is an integrator within the frequency band of the input signal.